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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/586,849

07/20/2006

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Q79703

3462

23373 7590 10/12/2007
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EXAMINER

LE, THAO X

ART UNIT

PAPER NUMBER

2814

MAIL DATE

DELIVERY MODE

10/12/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/586,849	Applicant(s) MIKI ET AL.
	Examiner Thao X. Le	Art Unit 2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) 24-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/20/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-23 in the reply filed on 9/27/07 is acknowledged.

Drawings

2. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because Fig. 1, 2, 5 and 6 are not legible. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Objections

3. Claims 2-23 are objected to because of the following informalities: "A gallium nitride" should be changed to "The gallium nitride". Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-5, 14-18, and 21-23 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6881983 to Narayan et al.

Regarding claim 1, Narayan discloses a gallium nitride compound semiconductor multilayer structure in fig. 1-2 comprising a substrate 6, and an n-type layer 4, an active layer 8, and a p-type layer 10 formed on the substrate 6, the active layer 8 being sandwiched by the n-type layer 4 and the p-type layer 10A, and the active layer 8 comprising a thick portion and a thin portion, fig. 1, wherein the active layer has a flat lower surface (on the substrate side) and an uneven upper surface so as to form the thick portion and the thin portion, fig. 1-2.

Regarding claims 2-3, Narayan discloses the gallium nitride compound semiconductor multilayer structure according to claim 1, wherein the active layer contains In, wherein the upper surface of the active layer is covered with a thin layer 10 not containing In, fig. 2.

Regarding claims 4-5, Narayan discloses the gallium nitride compound semiconductor multilayer structure wherein the thick portion has a thickness of 15 to 50 or 15-30 Å, fig. 3A-6B.

Regarding claims 14-16, Narayan discloses the gallium nitride compound wherein the active layer is at least one well layer in a multiple quantum well structure, wherein the multiple quantum well structure is repeatedly stacked 3 to 10 times or 3 to six times, fig. 2.

Regarding claims 17-18, Narayan discloses the gallium nitride compound semiconductor multilayer structure wherein the multiple quantum well structure has a barrier layer formed of a gallium nitride compound semiconductor selected from GaN, AlGa_N, and InGa_N which has an In content lower than that of the InGa_N forming the active layer, wherein the barrier layer is formed of GaN, fig. 2.

Regarding claim 21, Narayan the gallium nitride compound semiconductor light-emitting device, wherein the device has a negative electrode 32 and a positive electrode 20, the negative electrode and the positive electrode being provided on the n-type layer and the p-type layer of a gallium nitride compound semiconductor multilayer structure according to claim 1, respectively, fig. 8A.

Regarding claim 22, Narayan discloses the gallium nitride compound semiconductor light-emitting device according to claim 21, which has a flip-chip-type device structure.

With respect to “has a flip-chip-type device structure” of the claimed invention does not result in a structural difference between the claimed invention and the prior art, thus claimed invention is only an art recognized suitability for an intended purpose, MPEP 2144.07 or it does not carry weight because the limitations are either function or intended use that do not limit the claim to a particular structure, MPEP 2111.04; thus structure of Narayan is capable of performing the same function.

Regarding claim 23, Narayan discloses the gallium nitride compound semiconductor light-emitting device according to claim 22, wherein the positive electrode has a reflection-type structure.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 6-13 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6881983 to Narayan et al.

Regarding claims 6-9, 11-13, and 19-20, Narayan does not disclose the gallium nitride compound semiconductor multilayer structure wherein the thick portion has an arithmetic mean width, as measured in a cross-section of the multilayer structure, of 10

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nm or more, or wherein the thick portion has a width, as measured in a cross-section of the multilayer structure, of 100 nm or more, wherein the thin portion has a thickness of 15 Å or less, or wherein the thin portion has an arithmetic mean width, as measured in a cross-section of the multilayer structure, of 100 nm or less, or wherein the difference in thickness between the thick portion and the thin portion falls within a range of 10 Å to 30 Å, or wherein the thick portion has an area accounting for 30% or more the entire area of the active layer, or wherein the thick portion has an area accounting for 50% or more the entire area of the active layer, or the barrier layer has a thickness of 70-500 Å or 160 Å or more.

However, Narayan discloses the thickness of active layer 12 having thickness variation, col. 4 lines 45-50 and the bandgap of the active layer is dictated by the equation (1) in col. 4 line 5. Accordingly, it would have been obvious to one of ordinary skill in art to use thickness and thickness variation teaching of Narayan in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. MPEP 2144.05.

Regarding claim 10, Narayan discloses the gallium nitride compound semiconductor multilayer structure according to claim 9, wherein the thin portion has a width, as measured in a cross-section of the multilayer structure, of 50 nm or less, col. 4 lines 45-50.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

10 Oct. 2007

/Thao X Le/
Primary Examiner, Art Unit 2814